

IN THE CLAIMS:

Please CANCEL claims 1-30 without prejudice to or disclaimer of the recited subject matter.

Please ADD new claims 31-59, as follows. For the Examiner's convenience, all claims currently pending in this application have been reproduced below:

1-30. (Cancelled)

31. (New) A stage apparatus comprising:

a stage movable along at least two axes;

a first optical unit which is arranged outside the stage and splits a first laser beam for measuring a position of the stage in a first direction, into first reference and measurement beams;

a second optical unit which splits a second laser beam for measuring a position of the stage in a second direction, into second reference and measurement beams;

a first reflection unit which is arranged on the stage and reflects the first measurement beam;

a second reflection unit which is arranged outside the stage and reflects the second measurement beam;

a first detector which is arranged outside the stage and detects an interference beam of the first measurement and reference beams; and

a second detector which is arranged outside the stage and detects an interference beam of the second measurement and reference beams.

32. (New) The apparatus according to claim 31, wherein said first and/or second optical unit makes the first and/or second reference beam and the first and/or second measurement beam interfere.

33. (New) The apparatus according to claim 31, wherein said first and/or second detector makes the first and/or second reference beam and the first and/or second measurement beam interfere.

34. (New) The apparatus according to claim 31, wherein an incident direction of the second laser beam into the second optical unit and an irradiating direction of the second measurement beam from said second optical unit to the second reflection unit are perpendicular to each other.

35. (New) The apparatus according to claim 31, wherein the first and second directions are perpendicular to each other.

36. (New) The apparatus according to claim 31, wherein a movement stroke of the stage in the first direction is longer than a movement stroke of the stage in the second direction.

37. (New) The apparatus according to claim 36, wherein the incident direction of the second laser beam into the second optical unit is parallel to the first direction and an irradiating direction of the second measurement beam from the second optical unit to the second reflection unit is parallel to the second direction.

38. (New) The apparatus according to claim 31, wherein said stage is movable in a third direction perpendicular to the first and second directions.

39. (New) The apparatus according to claim 38, further comprising an irradiator for emitting a measurement beam in the third direction.

40. (New) The apparatus according to claim 31, wherein said stage is movable in a direction around an axis perpendicular to the first and second directions.

41. (New) The apparatus according to claim 31, wherein the first measurement beam includes a plurality of measurement beams.

42. (New) The apparatus according to claim 41, wherein a position of said stage in a direction around an axis perpendicular to the first and second directions is measured by using the first measurement beam.

43.(New) The apparatus according to claim 41, wherein a position of said stage in a direction around an axis along the second direction is measured by using the first measurement beam.

44. (New) The apparatus according to claim 31, wherein the second optical unit has a plurality of optical units on said stage.

45. (New) The apparatus according to claim 44, wherein the position of said stage in the direction around the axis along the second direction is measured by using the second measurement beam.

46. (New) The apparatus according to claim 44, wherein a shape of the second reflection unit is measured based on pieces of first direction position information of at least two points on said stage, and pieces of second direction position information of at least two points on said stage that are measured by using the second optical unit.

47. (New) The apparatus according to claim 46, wherein the second direction position information on said stage that is measured by using the second optical unit is corrected based on a measurement result of the shape of the second reflection unit.

48. (New) The apparatus according to claim 31, wherein the second reflection unit is supported at a Bessel point of the second reflection unit.

49. (New) The apparatus according to claim 38, wherein the position of said stage in the direction around the axis along the third direction is measured by using the second measurement beam.

50. (New) The apparatus according to claim 31, wherein a driving mechanism for driving said stage is controlled based on a measurement result of a position of said stage.

51. (New) The apparatus according to claim 31, wherein said stage includes a reticle stage which supports a reticle.

52. (New) A stage position measurement method for measuring a position of a stage, said method comprising the steps of:

irradiating first and second laser beams for measuring a position of the stage with a first optical unit arranged outside a movable stage and a second optical unit arranged on the stage;

splitting the first and second laser beams into first and second reference beams, and first and second measurement beams, by the first and second optical units;

irradiating the first and second measurement beams with a first reflection unit arranged on the stage and a second reflection unit arranged outside the stage;

reflecting the first and second measurement beams irradiated with the first and second reflection units;

making the reflected first and second measurement beams and the first and second reference beams interfere to generate first and second interference beams;

detecting the first and second interference beams; and

measuring a position of the stage on the basis of a signal concerning the detected first and second interference beams.

53. (New) A projection exposure apparatus comprising:

as a reticle stage and/or a wafer stage, a stage apparatus having a stage movable along at least two axes, a first optical unit which is arranged outside the stage and splits a first laser beam for measuring a position of the stage in a first direction, into first reference and measurement beams, a second optical unit which splits a second laser beam for measuring a position of the stage in a second direction, into second reference and measurement beams. a first reflection unit which is arranged on the stage and reflects the first measurement beam, a second reflection unit which arranged outside the stage and reflects the second measurement beam, a first detector which is arranged outside the stage and detects an interference beam of the first measurement and reference beams, and a second detector which is arranged outside the stage and detects an interference beam of the second measurement and reference beams.

54. (New) A semiconductor device manufacturing method comprising the steps of:

installing, in a semiconductor manufacturing factory, manufacturing apparatuses for performing various processes, the manufacturing apparatuses including a projection exposure apparatus which includes as a reticle stage and/or a wafer stage, a stage apparatus having a stage movable along at least two axes, a first optical unit which is arranged outside the stage and splits a first laser beam for measuring a position of the stage in a first direction, into first reference and measurement beams, a second optical unit which splits a second laser beam for measuring a position of the stage in a second direction, into second reference and measurement beams, a first reflection unit which is arranged on the stage and reflects the first measurement beam, a second reflection unit which is arranged outside the stage and detects an interference beam of the first measurement and reference beams, and a second detector which is arranged outside the stage and detects an interference beam of the second measurement and reference beams.

55. (New) The method according to claim 54, further comprising:

connecting the manufacturing apparatuses by a local area network; and
communicating information about at least one of the manufacturing apparatuses between the local area network and an external network outside the semiconductor manufacturing factory.

56. (New) The method according to claim 55, further comprising performing one of (i) accessing a database provided by a vendor or user of the projection exposure apparatus via the external network to obtain maintenance information of the manufacturing apparatus by data communication, and (ii) performing production management by data communication between the semiconductor manufacturing factory and another semiconductor manufacturing factory via the external network.

57. (New) A semiconductor manufacturing factory comprising:

manufacturing apparatuses, for performing various processes, the manufacturing apparatuses including a projection exposure apparatus which includes as a reticle stage and/or a wafer stage a stage apparatus having a stage movable along at least two axes, a stage movable along at least two axes, a first optical unit which is arranged outside the stage and splits a first laser beam for measuring a position of the stage in a first direction, into first reference and measurement beams, a second optical unit which splits a second laser beam for measuring a position of the stage in a second direction, into second reference and measurement beams, a first reflection unit which is arranged on the stage and reflects the first measurement beam, a second reflection unit which is arranged outside the stage and reflects the second measurement beam, a first detector which is arranged outside the stage and detects an interference beam of the first measurement and reference beams, and a second detector which is arranged outside the stage and detects an interference beam of the second measurement and reference beams;

a local area network for connecting said manufacturing apparatuses; and

a gateway which allows the local area network to access an external network outside the factory,

wherein information about at least one of said manufacturing apparatuses can be communicated.

58. (New) A maintenance method for a projection exposure apparatus which is installed in a semiconductor manufacturing factory, and includes as a reticle stage and/or a wafer stage a stage apparatus having a stage movable along at least two axes, a first optical unit which is arranged outside the stage and splits a first laser beam for measuring a position of the stage in a first direction, into first reference and measurement beams, a second optical unit which splits a second laser beam for measuring a position of the stage in a second direction, into second reference and measurement beams, a first reflection unit which is arranged on the stage and reflects the first measurement beam, a second reflection unit which is arranged outside the stage and reflects the second measurement beam, a first detector which is arranged outside the stage and detects an interference beam of the first measurement and reference beams, and a second detector which is arranged outside the stage and detects an interference beam of the second measurement and reference beams, said method comprising the steps of:

causing a vendor or user of the exposure apparatus to provide a maintenance database connected to an external network of the semiconductor manufacturing factory;

authorizing access from the semiconductor manufacturing factory to the maintenance database via the external network; and

transmitting maintenance information accumulated in the maintenance database to the semiconductor manufacturing factory via the external network.

59. (New) A stage apparatus comprising:

a stage movable along at least two axes; and

an interferometer which measures a position of the stage, wherein said interferometer has a first reflection unit which is arranged on the stage and measures the stage in a first direction and a second reflection unit which is arranged outside the stage and measures the stage in a second direction.